

AC. 149

# ANNUAL REPORT

ON THE

# MEDICAL RESEARCH INSTITUTE

FOR THE YEAR

1921.

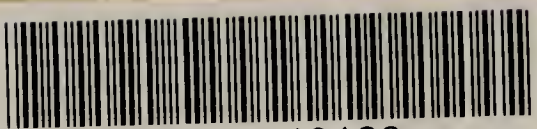
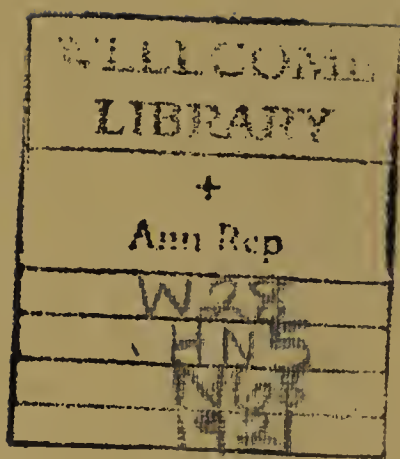
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# ANNUAL REPORT.

## MEDICAL RESEARCH INSTITUTE FOR THE YEAR 1921.

### ERRATA.

Page	3, line 10 from bottom, for	"image "	read	"imago "
"	" " 3 " " "	"latter "	"	"later "
"	4 " 22 " " "	"infections "	"	"infestations "
"	" " 17 " " "	"Iadamoeba "	"	"Iodamoeba "
"	" " 16 " " "	"butschlu "	"	"bütschlii "
"	" " 15 " " "	"nava "	"	"nana "
"	" " 12 " " "	"Saginata "	"	"saginata "
"	" " 7 " " "	"butschlu "	"	"bütschlii "
"	5 " 9 " top "	"Dultice "	"	"Dulcite "
"	" " 5 " bottom "	"tests "	"	"esters "
"	6 " 5 " " "	"Ikor, Offiong "	"	"Ikor-Offiong "
"	7 " 24 " top before	"26 "	insert	"the "
"	9 " 21 " " for	"therefore "	read	"thereafter "
"	" " 3 " bottom "	"ago "	"	"before "
"	10 " 6 " top "	"usual similarity "	"	"usual : Similarly "
"	11 (footnotes) top line	"Polymorphoruclear "	"	"Polymorphonuclear "
"	" " " " " "	"neutrophilis "	"	"neutrophils "
"	" " " " " "	"Mononuclears "	"	"Mononuclears "
"	" " " " " "	"Ecunophils "	"	"Eosinophils "
"	" " " line 2 from top "	"Erythrophagocytis "	"	"Erythrophagocytes "
"	" " " 3 " " "	"endothelia "	"	"endothelial "
"	" " " " " " after	"cells "	insert	;
"	12, line 3 from top for	"splamodia "	read	"plasmodia "
"	" " 9 " " before	"22 "	insert	"A differential leucocyte count was performed in "
"	" " 13 " " for	"Gambiense "	read	"gambiense "
"	" " 12 " bottom "	"quantitative "	"	"quantitatively "
"	" " 5 " " before	"three "	insert	"omentum. Seven cases of Sarcoma occurred,"
"	13 " 20 " top for	"buliciomyia "	read	"Culiciomyia "
"	" " 22 " " "	"inconspicuous "	"	"inconspicuosus "
"	13 " 24 " " "	"Hodesia "	"	"Hodgesia "
"	" " 9 " bottom "	"Saginata "	"	"saginata "
"	14 " 10 " " "	"Foorde "	"	"Forde "
"	" " 6 " " "	"Perie "	"	"Pirie "





# Annual Report on the Medical Research Institute for the year 1921.

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MEDICAL RESEARCH INSTITUTE,  
YABA,  
NIGERIA,  
5th August, 1922.

SIR,

I have the honour to present the Annual Report of the Medical Research Institute for the year 1921.

The principal subjects to which attention was devoted were (a) the intermediate host of *Loa loa*, (b) the causative agent of Dysentery in Lagos, (c) the treatment of Leprosy, and (d) the records of Black-water Fever, in Nigeria.

The following members of the Staff were on duty for the periods stated:—the Director, Dr. A. Connal, 15th April to 31st December; the Assistant Bacteriologist, Dr. W. A. Young, 1st January to 23rd July; and the Laboratory Attendant, Mr. E. F. Hines, from 1st January to 4th April and from 7th October to 31st December; Mr. S. A. Cardoso left on promotion in April, and was succeeded by Mr. E. B. Onimole in the Clerk's Office. Mr. Sawyerr, the African Laboratory Assistant, was on duty throughout the year.

Further evidence has accumulated of the clamant need for a Physiologist who would undertake the examination of the so-called native poisons, investigate the native drugs, and consider the metabolic changes which occur in the local diseases.

The appointment of an Assistant Bacteriologist has already been abundantly justified. It has rendered possible the expedition to Sapele, and it has enabled a branch laboratory to be instituted actually in Lagos Hospital.

A second Laboratory Attendant is required for duty, mainly in the clinical laboratory in Lagos, and also for relief purposes at Yaba. The creation of a chemical post would necessitate the appointment of a third European Laboratory Attendant.

The needs of the Medical Research Institute have met with consistent helpfulness at your Office, particularly within the last few years. I feel sure that the requirements will continue to receive your deep interest and your kindly consideration.

I have the honour to be,

Sir,

Your obedient Servant,

A. CONNAL,  
*Director, Medical Research Institute.*

The Director,  
Medical and Sanitary Service,  
Lagos.

## THE DEVELOPMENT OF LOA LOA IN CHRYSOPS.

A detailed account of the work done on this subject, by the Director and Mrs. S. L. M. Connal, has been published in *The Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1922, May, Volume XVI, Nos. 1 and 2, pp. 64-89. A synopsis, therefore, will suffice for the present report.

Two months were spent at Sapele, and ten days at Calabar, for the purposes of the investigation. As clean flies could not be obtained, that is, flies bred in the laboratory from larvæ or pupæ, the experiments had to be carried out with wild flies, that is, flies which had had, in Nature, an opportunity of sucking blood before capture. This necessitated an enquiry as to the percentage of already infected flies at the particular season, in both districts. It worked out at 3·5% in a total of 225 freshly caught Chrysops in Sapele and at 0·0% in 31 specimens in Calabar. Of the experimentally infected flies, totalling 288, examined at Sapele, 3·1% were found to have already been infected in Nature, and at Calabar only one out of 70 experimentally infected insects was proved to have been previously infected in Nature. The wild flies were readily obtainable at Sapele during June and July, but they were somewhat scarce at Calabar in December.

The experiments consisted in allowing individual Chrysops to feed on human cases in whose blood the embryos were present, and afterwards dissecting the insects. Five natives, who were all volunteers, were chosen as the subjects of these experiments. All of them showed or had shown the clinical signs of infection with *Loa loa*, and all of them were proved, by frequent examination, to harbour in their blood the embryos of *Loa loa*, without admixture of other embryos. Twenty feeding experiments, which involved the initial feeding of 595 flies, were conducted at Sapele, and 3 experiments, using 70 flies, were performed at Calabar. Three hundred and fifty-eight of these flies have been examined, and the remainder have been presented to the London School of Tropical Medicine, the Liverpool School of Tropical Medicine, and the Wellcome Bureau of Scientific Research. Each experiment lasted from one to three hours, and each fly, after it had fed to repletion, was placed in a numbered cage along with the others fed at the same sitting.

The main difficulty encountered in the investigations was in keeping the insects alive for a sufficiently long period. Only by approximating the conditions of captivity as closely as possible to those obtaining in Nature, particularly in regard to shade and moisture, were the attempts successful. Even under the most favourable circumstances, however, there was a high death-rate, which was not altogether due to the infection. Minor accidents, such as the entrance of rats and of ants to the cages were easily avoided after one experience. Each morning after the initial meal of infected human blood, each fly was offered a feed on a guinea-pig or on sugar and water, with the exception of one, which was chosen for the purposes of dissection. Occasionally, however, two or three were dissected of a morning. By this procedure, it was possible to observe the changes which took place in the embryo, within the fly, from the time of ingestion until the stage was reached when the fully metamorphosed larvæ were ready to re-enter man and to undergo another period of change which would result in the attainment of the adult stage. It was found, by these methods, that the full cycle of development of the embryo within the Chrysops occupies a period of from ten to twelve days. Within an hour or two of passing with the blood into the stomach of the fly, the young worms, the embryos, cast their sheath, thus obtaining greater freedom of movement, and after a short rest, they proceed to penetrate the stomach wall and finally lodge in the connective and muscular tissues, for preference at the tip of the abdomen, but also, in lesser numbers, at other parts of the abdomen, and in the thorax and the head.



During the first three days, growth is rapid, and is mainly in the direction of a thickening of the body, although some lengthening also takes place. Two vacuolated areas appear, one near the head, and the other near the tail. An alimentary canal develops, which begins at the simple mouth in front and ends in an anus situated at the posterior vacuolated area. The tail is sickle-shaped, finely drawn out and somewhat curved. During the next three days, the young worm elongates more rapidly, proportionately, than it broadens, and on the sixth day there is another shedding of the cuticle. When this process is over, the worm appears with a tri-lobed tail, and the vacuolated areas have disappeared. From this day onwards, the larva lengthens rapidly and there is no increase in breadth. On the tenth day or later, the mature larvæ are to be found mainly in or near the proboscis, awaiting their opportunity to escape. This opportunity is afforded on the next occasion on which the fly feeds, particularly when the skin of the animal supplying the feed to the fly is warm and moist. It must be understood that the larvæ are not situated in the biting mouth parts, but in the sheath, the labium, and they do not gain entrance to their mammalian host by means of the puncture through the skin which the fly inflicts. They make their own way out of the labium, *via* the labella, emerge on the skin surface and after extremely rapid movement within a very circumscribed area, they penetrate by means of the pores to the deeper structures. The actual passage from the fly host to the mammal host is a matter of a few seconds only. No transmission experiments were done on the human subject but the actual exit of the larvæ was observed on seventeen occasions, from the fly to the guinea-pig. Few or no larvæ would leave the proboscis whilst the fly fed on rabbits or monkeys, the skin of these animals being very dry.

In the course of the ten to twelve days which are required for the completion of the cycle of development in the fly, the young worm increases its length one hundred times. Throughout its whole existence in the insect, it is capable of movement and these movements are more active and further afield from the seventh day onwards. It was demonstrated also that all the embryos ingested by the fly at its infecting feed, do not develop with equal rapidity. Even at the end of three days, some embryos can be found alive, active and capable of further development, but still within the stomach. This provides that at the end of the cycle of development for a period of at least three days and probably for four or five days, freshly matured larvæ are ready for transmission to their human host and thus the chances of some larvæ reaching this host are increased. In other words the fly remains capable of transmitting infection from the tenth or twelfth day until the fourteenth or sixteenth day at least.

Various notes were also made on the habits and life history of *Chrysops*. Four species of this genus of the family of *Tabanidae* occur in Nigeria. *C. silacea* is the commonest and *C. dimidiata* next, *C. longicornis* is comparatively scarce, and all three are confined to the Southern Provinces. They are most abundant in those areas where forest swamp is present and their numbers are few or none where only low bush obtains. *C. distinctipennis*, the fourth species, appears to be restricted to the Northern Provinces. Attempts to trace the stages of development from the egg through the larval and pupal stages to the imago were not successful. The probability is that the process is a protracted one, and that many months elapse before the newly hatched grub reaches the fly stage. One captive fly laid a batch of about one hundred eggs, which all hatched within five days. The larvæ which appeared from these ova were similar in every respect to some which were found in the moisture at the base of the leaves and flowers of certain river-side and swamp plants, but no information was obtained as to the latter stages of development. The fly is a pest, a persistent and voracious blood-sucker, and in certain areas of the Southern Provinces and also in Cameroons where the insects are abundant, the native



population is heavily infected with *Loa loa*. Preventive measures should be similar to those undertaken for the eradication of other insect-borne disease, such as Malaria and Trypanosomiasis, namely, drainage to reduce the number of possible breeding places, clearing of trees to deprive the fly of the shade which is necessary for its winged existence, and, where such schemes are impracticable from the monetary aspect or because of the magnitude of the work involved, the establishment of stations in infected areas should be avoided. Sapele town, itself, is a fine example of the value of clearing and drainage. The investigations thus briefly recorded were greatly facilitated by the kind help of the following:—Mr. Methven, the Manager of the Rubber Plantation near Sapele, Mr. M. H. Martindale, the District Officer and Dr. Macfarlane and Dr. Salmon Smith, the Medical Officers. At Calabar, Dr. Adam, Dr. Braithwaite and Dr. Quirk, M.B.E., gave much willing help. Dr. Stewart at Lagos, rendered great assistance with the microphotographic work as did also Dr. Stevenson of the Wellcome Bureau of Scientific Research in London. It is a very great pleasure to acknowledge the help obtained in these various ways.

Regarding the prevalence of *Loa loa* infection, as evidenced by the presence of embryos in the blood, only a little work has been done. At Sapele, 467 natives were examined. Only one drop of blood was taken from each person, a fresh preparation, obtained between mid-day and 1 p.m. Seventy-five showed embryos of *Loa loa* (*Microfilaria diurna*) which gives a percentage of just over sixteen.

Dr. Young examined 199 prisoners in Lagos and found that 33 showed embryos of *Loa loa* in the blood. This also gives a percentage of between sixteen and seventeen. He found that the smallest number of embryos per cubic millimetre was one, the largest number 1,020 and the average 211 per cubic millimetre.

#### DYSENTERY AND OTHER INTESTINAL CONDITIONS.

Four hundred and fifty-two samples of faeces were examined during the year. Of this total 328 were from Europeans and 124 from natives. In several instances two or more samples were received from one case, so that the number of individuals concerned is less than the number of samples examined. As usual, Amoebic Dysentery bulked largely amongst the Europeans and Helminthic infections were most prevalent amongst the natives. In the former, the Europeans, *Entamoeba histolytica*, in the free active form or in the pre-cystic stage and sometimes also along with the cysts themselves, occurred in 51 cases. The cysts alone were found in other 16 individuals. Of the other intestinal protozoa, *Lamblia* was observed in four cases, *Iodamoeba bütschlii* in two and *Trichomonas* in one. The number of cases in which *Entamoeba coli* and *Endolimax nana* were found, was not recorded but both parasites are of fairly frequent occurrence, particularly the former. Ova of *Tricocephalus* were noted in four cases, of *Ascaris* in one and of *Ankylostomum* in one. Segments of *Taenia Saginata* were passed, in one case. The number of negative examinations was two hundred and forty-eight. Amongst the natives, *Entamoeba histolytica* in the free form was observed in 24 cases and the cysts alone were noted in sixteen cases.

*Iodamoeba bütschlii* was found in three cases. *Endolimax nana* and *Entamoeba coli* were frequently met with. *Tetramitus* was recorded on four occasions and *Lamblia* was encountered in one.

*Ascaris* ova were noted in 35 cases, *Tricocephalus* ova in 19, *Ankylostomum* ova in ten. It should be added that more frequently than not, the ova of two or more kinds of worm were found in the same patient. In 47 samples the findings were negative.



In continuation of the work of the previous three years, all cases in which there were signs of intestinal irritation were particularly examined as to the presence of Dysentery bacilli. It may be said at once that in no case were such bacilli isolated. Two or more of the various special media for the isolation of the pathogenic intestinal bacteria in plate culture were always used and suspicious-looking colonies were picked out for further examination. For this purpose the usual six sugars were employed—Glucose, Lactose, Maltose, Saccharose, Dultice and Mannite. In two instances, both in Europeans and both fatal cases of dysentery, the macroscopic and microscopic appearances of the stool, the clinical course of the illness, the complete lack of response to Emetine treatment, and the post-mortem appearances in one of them, suggested the possibility of a Flexner or Shiga infection. The blood-serum of both patients failed to agglutinate the laboratory stock-cultures of these bacilli. *Entamoeba histolytica* was demonstrated in both cases, but nevertheless there was an uncomfortable impression that the amoeba was not the only cause of the grave disturbance. The number of negative findings, namely 295 in a total of 452 samples is large, but it includes a number in which the cause of the intestinal derangement was due to dietetic indiscretions, unsound food, and other undefined causes.

As regards other intestinal diseases, a *Bacillus typhosus* infection was diagnosed by the Widal agglutination test in seven cases, and an infection due to *Bacillus paratyphosus* B in one case.

From post-mortem material, or from specimens removed at operation, the lesions of acute Amoebic Dysentery were demonstrated in three cases, Tubercular ulceration of the small intestine in one, and Typhoid ulceration of the ileum in one.

In five cases of Appendicitis, all in natives, there was acute inflammation with abscess formation in two and a chronic inflammatory thickening and occlusion in three, in two of which a number of adult *Tricocephalus* were present.

It may be noted here that in the early part of the year, Dr. Young examined the intestinal contents of a large number of rats trapped in or near Lagos. The object of the investigation was to find out to what extent these rodents harboured *Lambia*. This protozoon was not found in any of the animals.

In connection with the question of the value of Charcot-Leyden crystals in the diagnosis of Amoebic Dysentery a few notes must be added. Thomson (J. C.) and Robertson (A.), (*Journal of Tropical Medicine and Hygiene*, 15th November, 1921, pp. 1—4) and Acton (H. W.), (*Indian Journal of Medical Research*, Vol. VI, 1918), hold that the presence of these crystals is strongly suggestive of an amoebic infection. A careful search was made in every case of amoebic dysentery examined at the Medical Research Institute and although accurate figures have not been kept, it may be said that Charcot-Leyden crystals frequently occurred. In two cases, where the clinical signs pointed to a chronic amoebic infection, the finding of the crystals tended to confirm the diagnosis until at some later examination, *Entamoeba histolytica* was finally demonstrated.

#### LEPROSY.

Experience of various forms of treatment in Leprosy during the past twelve years has led to the belief that the most hopeful outlook has been opened up by the tests of Chaulmoogra oil. These are supplied as Moogrol and through the kindness of Dr. Balfour, C.B., C.M.G., and Colonel Stammers, of the Wellcome Bureau of Scientific Research, a generous quantity of that preparation was received for use in a course of treatment on the Lepers at Yaba Asylum, near Lagos. Dr. Anderson,



and afterwards Dr. Sandeman, M.C., who were in charge of the patients, co-operated in the work. Four patients were chosen, namely C.A., who had shown no signs of improvement with previous courses of treatment, and L.A., A.K., and D.A., who had all improved under previous courses, but had relapsed on their cessation (*see* previous reports). The patients were first photographed, and notes made as to their present condition. A start was made on 22nd August, 1921, and one cubic centimetre of Moogrol was given intramuscularly, once a week. This dose was increased by 1 c.c. at intervals of three weeks, until, by 26th December, 1921, a dose of 6 c.c. weekly was being administered. The improvement, which rapidly appeared in each case, has been steadily maintained but as the course is a comparatively short one, it is not intended to make a complete and exhaustive report.

All of the patients at first suffered from a mild febrile disturbance, with some malaise which came on a few hours after the dose, but cleared off within 24 hours. After the first increase of the dose, only one complained of systemic disturbance, and there were no further complaints until after the first administration of the 5 c.c. dose, when all four suffered a little. The most important practical point which emerged is that occasionally, when the dose is 5 c.c. or larger, the absorption of the drug is slow and there is a greater amount of local reaction. Under these conditions it was sometimes found desirable to lessen the dose or to allow more than a week to pass before the next administration. Apart from the definite improvement which has taken place in all the patients, the most satisfactory sign is that they all retain a desire to persist with the treatment. The usual experience with these lepers is that they have been optimistic for the first month or two, and then, one by one they become less eager and finally refuse further medication.

### BLACKWATER FEVER.

Reports on twenty-six cases of Blackwater Fever have been received for the year. A special form has been in use for the reporting of these cases, which has proved somewhat cumbersome in practice. On the advice of the Director of Medical and Sanitary Service, the Form has been reconstructed and it is believed that a more complete study of the cases will be rendered possible thereby.

Eighteen cases were reported from the Northern Provinces and eight (including two from British Cameroons) from the Southern Provinces of the Colony.

With one exception, all the patients were males and all the sufferers were Europeans of British nationality. Nineteen were non-officials, including eleven members of the mercantile community, two Bankers, two employees of Tin-Mining Companies, a Missionary, a mechanical engineer and a timber expert. Amongst the seven Government Officials were two engine-drivers, one engineer, a guard, and a foreman-platelayer of the Railway Department, an Administrative Officer of the Political Department and a Sergeant-Major of the West African Field Force.

The months in which the cases occurred were January 4, February 3, March 1, April 3, May 2, June 2, July 1, August 3, September 2, October 1, November 3 and December 1.

The towns at, or near, which the cases occurred were Kano 5, Kaduna 3, Ibi 2, and one case each at Atani (Onitsha) Bamenda, Benue Bridge, Bukuru, Burutu, Gita (Nassarawa), Ikor, Offiong (Calabar), Lagos (Ido), Lokoja, Minna, Naraguta, Offa, Sapele, Victoria, Ubiaja and Zaria.

The age in individual cases was 21 years, 22, 25, 26, 27 (four cases), 28 (two cases), 29, 30 (two cases), 32 (two cases), 33 (three cases), 35, 38, 40, 43, 45, 48, 52 and 58 years.



Seventeen cases occurred in those whose first visit it was to West Africa. In other two instances, it was the first visit after a lapse of time, 5 years in one case and eighteen years in the other. Eight of the seventeen had been previously, for considerable periods, in other malarious countries and the remaining nine had not been out of Britain before. In two cases there is no history of the previous movements of the patient. Of the remaining five in the total of 26 cases, two men had ten years' experience of Nigeria, one had seven years', one had five years', and the last had three years' experience of the Colony (including the time spent on leave).

As regards the period of continuous residence in West Africa before the disease occurred, in the seventeen cases noted above it corresponds to the total experience, namely, 4 months, 9, 10 (three cases), 11 (two cases), 13, 14, 16 (two cases),  $16\frac{1}{2}$ , 18, 20 (two cases), and 24 months. There was no information on this point in one of the reports. In the case of the two individuals who had returned to Nigeria after a number of years, the continuous residential period was 4 months in the one and 17 months in the other. Of the two patients who had spent ten years in West Africa the present tour was ten months in the first and 13 months in the second. The corresponding periods for the others who had previous service were 18 months (seven years), 12 months (five years) and 14 months (3 years). In one case where no figures were given as to previous service, the continuously resident period was 21 months. In the last case of 26 there was no information as to the length of the present tour.

There was a definite history of previous attacks of Malarial Fever in 23 cases and this information was omitted in the other three.

The habits of the patient in regard to the prophylactic use of Quinine were noted in 24 cases. The drug was taken irregularly or not at all by seventeen. Of the remainder, one took "five grains regularly" and in his tour of 11 months' duration he had three attacks of Malaria. Another took 20 grains of the Hydrochloride on the Sunday and 15 grains of the same salt on the Wednesday of each week. He had three or four attacks of Malaria in his present tour of 16 months. This patient had twice suffered from Blackwater fever, in Brazil, once in 1910, and again in 1913 at Iquitos. Sixteen days after the onset of his haemoglobinuria in 1921, during which time he received no Quinine, he had a recurrence, both attacks being of short duration. A third patient who, for the last 4 months of his present tour, had been having "fever" every seven to ten days, took five grains of the Hydrochloride or the Sulphate "in the evening." A fourth patient had not missed a daily dose of five grains Quinine in his tour of eleven months, during which time he had one attack of Malaria. In the fifth case, the total residence was five years, the length of the present tour was not stated, the patient took five grains of the Bihydrochloride daily, and there was no note as to the occurrence of Malaria. The sixth patient took five grains of the Hydrochloride every day, and suffered from "repeated attacks of fever." In the seventh case, five grains of the Bihydrochloride were taken three times a week, and several attacks of Malaria had occurred.

Concerning the administration of quinine, just before the onset of haemoglobinuria, information is given in nineteen cases.

In three of these no quinine had been taken for at least ten days previously. In other four cases, only the ordinary prophylactic dose of five grains had been taken. The various details, however, are more readily grasped from the following table. In the last column, the heading "Time" refers to the period elapsing between the taking of the last dose of quinine and the onset of haemoglobinuria.

Case.	Salt Used.		How Taken.		Dosage.				Time.	
1	None	... ..	...	—	...	...	...	...	—	—
2		?	?	?	15 grains	...	...	...	12 hours.	...
3		?	?	?	10 "	...	...	...	4 "	...
5		?	?	?	10 "	...	...	...	12 "	...
8	Hydrochloride	...	...	Solution	30 "	...	...	...	7 "	...
10	None	...	...	—	...	...	...	...	—	—
13	"	...	...	—	...	...	...	...	—	—
14	Bisulphate	...	...	Tablet	10 "	...	...	...	8 "	...
15	Hydrochloride	...	...	?	10 "	...	...	...	12 "	...
16		?	?	?	5 "	(Prophylactic dose)	...	...	12 "	...
17	Hydrochloride	...	...	?	5 "	Four times daily for 5 days=100 grains	...	...	8 "	...
18		?	?	?	10 "	Daily for 2 days=20 grains	...	...	7 "	...
19	Hydrochloride	...	...	Solution	15 "	and 5 grains in 1 day=20 grains	...	...	4 "	...
21	Bihydrochloride	...	...	?	5 "	(Prophylactic dose)	...	...	9 "	...
22	Hydrochloride	...	...	?	5 "	"	...	...	3 "	...
23	"	...	...	?	15 "	...	...	...	6 "	...
24	"	...	...	?	10 "	...	...	...	10 "	...
25	Bihydrochloride	...	...	?	5 "	(Prophylactic dose)	...	...	4 "	...
26	"	...	...	?	10 "	...	...	...	4 "	...



The duration of the haemoglobinuria varied between 20 hours and seven days. Excluding the cases in which there were remissions or relapses (and including as two separate cases the instance of the patient who had two attacks, the second sixteen days after the first), there are notes in fourteen of the reports as regards the duration. It was  $1\frac{1}{2}$  days, 2 days (two cases), 3 days (six cases), 4 days (three cases),  $4\frac{1}{2}$  days and seven days. There were definite relapses in six cases. In case No. 6 there were two relapses, each of only a few hours' duration, one on the third and the other on the sixth day, the total duration of haemoglobinuria amounting to  $2\frac{1}{2}$  days. In case No. 10 there was a relapse lasting 12 hours, on the fifth day, the total duration of haemoglobinuria being  $1\frac{1}{4}$  days. In case No. 18 there were two relapses; the first, which lasted five hours, occurred on the 2nd day after the urine had been clear for five hours; the second, which lasted seven hours, took place on the third day, after the urine had been clear for twelve hours; the total duration of haemoglobinuria was only 20 hours. In case No. 19 there was a relapse on the 8th day, after the urine had been clear for 48 hours, and for the next week, there were frequent remissions. The duration of the first attack was 3 days. In case No. 22, the history of the relapses is interesting. The initial attack of haemoglobinuria lasted 24 hours. The patient, therefore, was put on small doses of quinine which were gradually worked up until by the 8th day after the urine had cleared, he was taking fifteen grains daily. At this point a relapse occurred, of four hours' duration. Again small and gradually increasing doses of quinine were instituted and by the 17th day after the clearing up of the first attack, the patient was having twelve grains daily, when the second relapse set in. Once again the quinine was started in small dosage and the patient was safely taking fifteen grains when he left hospital, recovered. The total period of haemoglobinuria was 32 hours. In case No. 23 there was a relapse of one day's duration, on the fifth day, the urine having been clear for the previous three days. The total duration of haemoglobinuria was three days.

A remission occurred in case No. 2, on the third day, and the haemoglobinuria lasted five days. In case No. 26, a remission took place on the second day, the duration of haemoglobinuria being five days. The duration of albuminuria is noted in nineteen cases. In all except three, it cleared up within 24 hours of the cessation of haemoglobinuria. As regards the exceptions, in case No. 1 the haemoglobinuria lasted five days and the albuminuria was present for three days later. In case No. 15, although the haemoglobinuria cleared in three days, albuminuria was still present when the patient died on the 13th day. In case No. 26 the haemoglobinuria passed off in three days, and the urine showed traces of albumen until the 7th day.

There had been a previous attack of Blackwater Fever in seven cases. In case No. 4 there had been two previous attacks, both of which occurred in Madagascar, but no dates are given. This patient was aged 52 years, and his present attack ended in death. Recovery took place in the remaining six cases. In case No. 6 there was one previous attack, which occurred almost exactly a year before the present. In case No. 8 there were previous attacks in Iquitos, Brazil, one in 1910 and another in 1913. This patient recovered rapidly from his Blackwater Fever in March, 1921, and was *en route* for England when he contracted a second attack thirteen days after the first had cleared. In case No. 17, there was a previous attack in 1915 as a result of which the patient was invalided from the service. In case No. 21 there was an attack ten months previously. In case No. 23 there had been an attack five months previously, which was not recorded as no Medical Officer was consulted. In case No. 24 there was a previous attack one year ago. There were eight deaths in the series of 26 cases, and as noted above, one of the deaths occurred in a patient who had on two previous occasions suffered

from an attack of Blackwater fever. The cause of death was suppression of urine in four, Cardiac failure in three and Haemorrhage from a duodenal ulcer in one. The age, in the fatal cases, was 21, 26, 27 (two cases), 30, 32, 35, and 52 years. The premonitory signs and symptoms of the disease as noted in the reports, call for no comment, as they show no variation from the usual similarity: as regards the course of the illness, no new facts emerge. An examination of the blood was made once, or more often, in 22 of the cases and in seven of these, blood films were forwarded to the Medical Research Institute. In the fifteen cases where the blood was examined by the Medical Officer in attendance, subtertian parasites were found in four and no parasites in the remainder, but the date on which the examination was made is not given. In seven cases from which blood-films were received at the Laboratory the following are the findings.



Case.	Day.	P.	S.	L.	M.	E.	T.	Ma.	My.	Ery.	Vac.	Nor.	Meg.	I.	II.	III.	IV.	V.	
7	1st	82·2	8·2	3	3·6	...	0·4	...	2·6	...	...	...	...	78·8	18	2·8	0·4	...	Subtertian rings few.
—	2nd	84·4	4·4	1·8	5	...	1·4	...	3	...	1	...	...	64·8	29·2	6	...	...	No parasites: no pigment.
8	1st	78·6	2·8	1·6	13·4	0·2	2·4	0·2	0·8	...	...	...	...	71·6	24·8	3·6	...	...	”
11	5th	76·2	6·6	2	9·4	...	0·8	...	5	...	1	...	...	61·2	29·2	8·8	0·8	...	”
14	?	79·2	4·4	1·6	11·8	...	0·6	...	2·4	3	2	...	...	73·2	19·6	6·4	0·8	...	Subtertian rings few.
18	?	50·8	25·4	6·4	12	0·2	0·4	...	4·8	3	1	...	...	80·8	17·2	2	...	...	No parasites: no pigment.
20	?	75·8	9·6	1·8	11·8	...	1	...	...	...	...	...	...	76	19·2	4·4	0·4	...	”
26	1st	83·2	5·6	2	7	...	0·8	...	1·4	...	...	...	...	76·8	17·6	4·8	0·8	...	”
—	2nd	77·6	13·2	2	4·4	...	1·2	...	1·6	...	...	...	...	67·6	24·8	7·2	0·4	...	”
—	3rd	66·4	14·4	3·6	13·2	1·2	0·4	...	0·8	...	...	...	...	59·6	26·8	10·8	2·8	...	”
—	4th	56·4	29·6	4·8	2·8	2	1·2	...	3·2	...	...	3	...	62·8	31·6	5·2	0·4	...	”
—	5th	54·4	23·6	5	8·6	2·2	0·8	1	4·4	...	...	10	3	72·8	19·6	6·8	0·8	...	”
—	6th	64·6	11·6	4·6	10	2·8	0·4	0·6	5·4	...	...	19	7	72	21·6	5·2	1·2	...	”

P=Polymorphonuclear neutrophils. S=Small lymphocytes. L=Large lymphocytes. M=Mononuclears. E=Eucnophils. T=Transitional cells. Ma=Mast cells. My=Myelocytes.  
Ery=Erythrophagocytis large mononuclear (endothelial) cells as met with in counting 500 whites.

Vac=Vacuolated large mononuclear endothelia cells as met with in counting 500 whites. Nor=Normoblasts. Meg=Megaloblasts as met with whilst counting 500 white cells I, II, III, IV  
and V are Arneth's groupings of the polymorph neutrophils.

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## BLOOD DISEASES.

Four hundred and forty-eight blood-smears were received for examination, 373 from Europeans and 75 from natives. In both, malarial splamodia were the most frequent parasites, and the subtertian was the commonest. Amongst the Europeans there were 92 cases of subtertian infection, the small ring forms being present in all except two, in which crescents were demonstrated. A quartan infection was found in four and a benign tertian in one. Embryos of *Loa loa* were noted in two cases, and of *Acanthocheilonema perstans* in one. *Trypanosoma gambiense* was observed in one case. 22 cases, 500 leucocytes being enumerated in each. Amongst the natives, a subtertian infection was observed in 15 individuals and a benign tertian in one. Pigmented mononuclear cells were noted in one case where no parasites could be found. *Trypanosoma Gambiense* was observed in one case. The embryos of *Acanthocheilonema perstans* were demonstrated in eight cases, and of *Loa loa* in three. In two of these cases, the embryos of both worms were present. A differential leucocyte count was made in 9 cases. The foregoing figures do not include the results obtained from the examination of the blood smears in Blackwater Fever. These have already been given in the foregoing section.

## VENEREAL DISEASE.

Smears from 43 cases of urethral discharge were examined and gonococci were shown to be present in twenty-two. In seven specimens of vaginal discharge, these organisms were demonstrated in six. Gonococci were also found in a sample of bloody urine, which strongly suggested Schistosomiasis.

*Treponema pallidum* was present in seven out of 26 smears from penile sore.

The Wassermann Reaction was carried out with 42 specimens of serum, a positive result being obtained in 12 and a partial haemolysis in five. Three samples of serum from yaws were also examined, with a positive result in two. Post-mortem material received for histological examination, yielded three cases of syphilitic cirrhosis of the liver, one of the pancreas and one of the lung.

## TUBERCULOSIS.

All the figures in this disease deal with cases in natives. Thirty-nine specimens of sputum were examined, tubercle bacilli, usually in large numbers, being present in sixteen. In post-mortem material, or in specimens removed at operation, a tubercular condition was demonstrated in 3 specimens of cervical glands, a testicle, a uterus, in a case of Meningitis, and, as already mentioned, in a case of ulceration of the intestine. Advanced tubercular disease was present in the lungs of two cases which came to post-mortem.

## EXAMINATION OF URINE.

Twenty-eight samples of urine were received for report. Pus was present in 3, blood and pus in 3, blood in 3, sugar (estimated quantitative) in 2, albumen in 1, hyaline casts in 1, and scanty cells (a case of varix) in 1. The remaining 14 samples were negative.

## HISTOLOGICAL EXAMINATIONS.

Epitheliomas numbered five, two from the penis, one from the tongue, one from the lip, one in the keloid growth of a scar resulting from vaccination. There were three Carcinomas, one of the uterus, one of the vagina and one of the three from bone, two from the shoulder, one from the sole, and one from the eye. There was a malignant odontoma from the lower jaw. Other tumours were four fibro-myomas (uterine), two simple adenomas, one from the breast and the other from the thyroid, a myxo-chondro-adenoma, a dermoid cyst, and an angioma.



Other specimens, not already mentioned, were four cases of fibrosis in lymphatic glands and one of lymphadenoma, two cases of acute inflammation with abscess-formation in the testicle, a fibrosis of the pancreas, a case of purulent meningitis due to the meningococcus, a case of acute congestion of the brain, varix of a hernial sac, organised blood-clot from the pleural cavity, a stomach showing extensive sloughing of the mucous membrane after drinking formalin, a heart exhibiting advanced fatty infiltration, a case of glomerular nephritis, cloudy swelling of the liver, a liver, also, containing nymphs of *porocephalus armillatus*, a spleen greatly cirrhotic and a lung presenting hypostatic congestion.

### ENTOMOLOGICAL.

Owing to various unavoidable causes, the usual monthly survey of the mosquito-larvæ collected within the Lagos Municipal area, was not carried out systematically. Records are available for a few of the months, but as they show no outstanding variations from the usual findings, they need not be quoted here.

A large collection of mosquitoes was received from Sokoto in November. The identifications were, *Mansonioides africanus* 25 ♀♀, *Anopheles rufipes* 3 ♂♂, 5 ♀♀, *A. domicolus* 6 ♀♀, *A. funestus* 5 ♀♀, *A. costalis* 2 ♂♂, *buliciomyia nebulosa* 4 ♂♂, 1 ♀, *Culex fatigans* 4 ♂♂, 2 ♀♀, *C. tigripes* 3 ♂♂, *C. quasigelidus* 2 ♂♂, *C. decens* 2 ♀♀, *C. grahami* 1 ♂, 1 ♀, *C. univittatus* 1 ♀ and *Micraedes inconspicuus* 1 ♀.

*Stegomyia fasciata* 3 ♂♂, 17 ♀♀ was received from Lokoja.

*Hodesia sanguinis* 5 ♀♀ was taken one morning in the laboratory.

A collection of *Chrysops silacea*, numbering 312, was received from Mr. Ozzard, who collected them during August in a Rubber Plantation near Calabar. Twenty of these, on dissection, proved to be infected with the larval stages of a filaria, probably *Loa loa*. The work in this section was, as usual, performed exclusively by Mrs. Summers Connal.

### MISCELLANEOUS.

The pus from four cases of so-called Pyomyositis was examined both culturally and otherwise. The only organism isolated, in each instance, was *Staphylococcus pyogenes aureus*. Four smears of pus from the eye were negative as regards the gonococcus. A streptococcus was isolated in one out of two cases of purulent synovitis of the knee. Leptra bacilli were not found in a smear from the nose. Meningococci were demonstrated in samples of pus from two cases of Meningitis. Autogenous vaccines were prepared for eight cases, principally boils, or pyorrhea. A lymphocytic increase was found in two samples of cerebro-spinal fluid and meningococci were present in a third case. Of two samples of pleural exudate, a mixed infection was presented in one, and the other was a simple transudation. Trypanosomes were not found in two smears of gland juice. An ulcer scraping and a spleen-puncture smear failed to reveal the presence of *Leishmania*.

Two specimens of *Loa loa* removed from the eye, were received, as were also a *Taenia Saginata*, with head, passed under treatment, and an *Ankylostomum duodenale*, vomited by a child.

Other specimens included blood smears from dogs, horses and fowls (some of the last showed spirochaetes) and various tissues from animals, mainly from the slaughterhouse.

Chemical and bacteriological examinations of water were made from nine wells, two streams, two springs, three soda-water factories and on numerous occasions, from various points of the Lagos water supply.

Numerous tinned foods, including fish, jam and fruit were examined at the request of the Medical Officer of Health.

Various exhibits such as cloths and knives were examined for blood and other stains, at the request of the Commissioner of Police. The percentage of alcohol in various drinks, essences and scents was estimated, at the request of the Comptroller of Customs.

A series of experiments on the effect of Ratinol on rats was carried out at the request of the Senior Sanitary Officer.

Meteorological records were kept daily, and the figures forwarded to the Director of Surveys.

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